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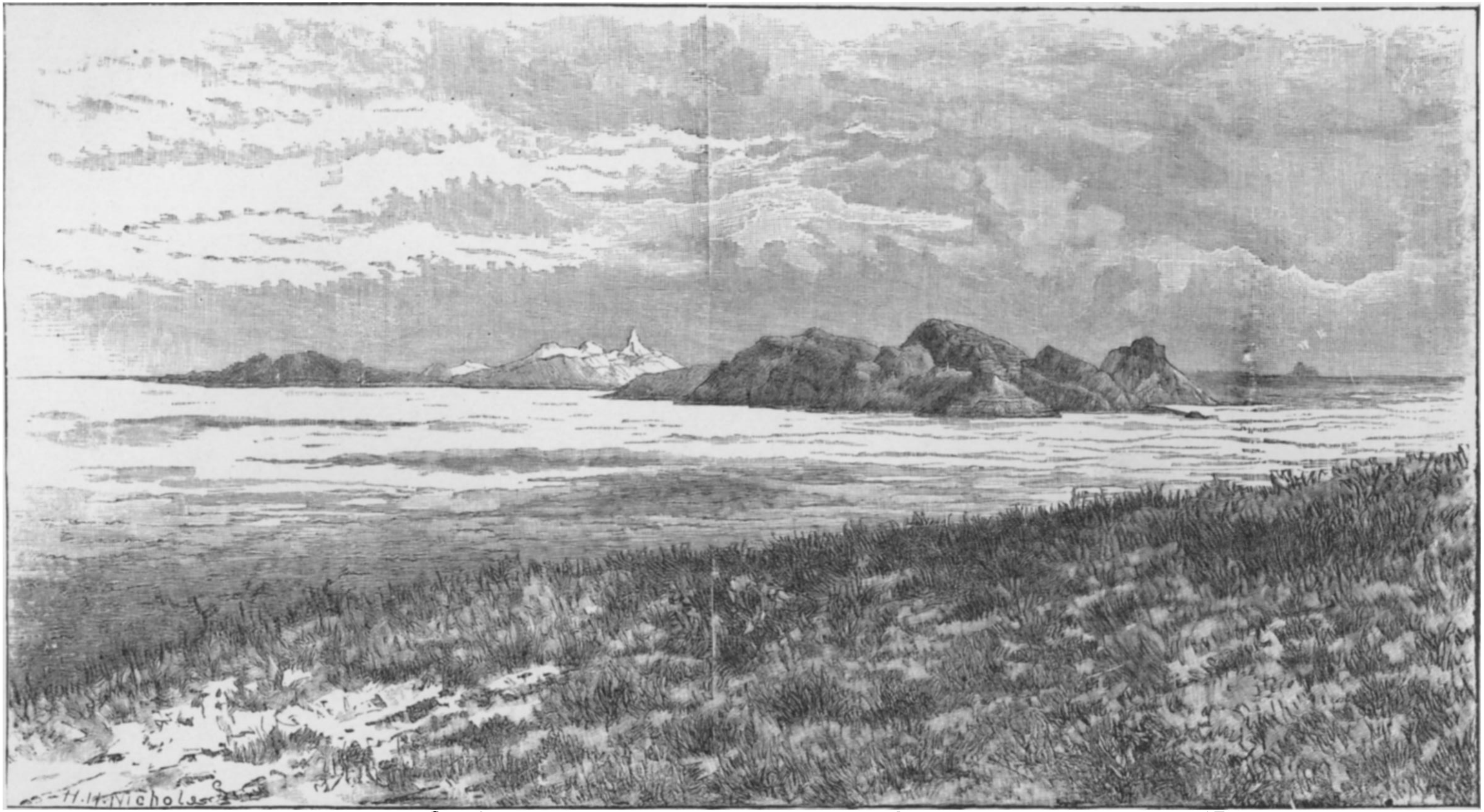
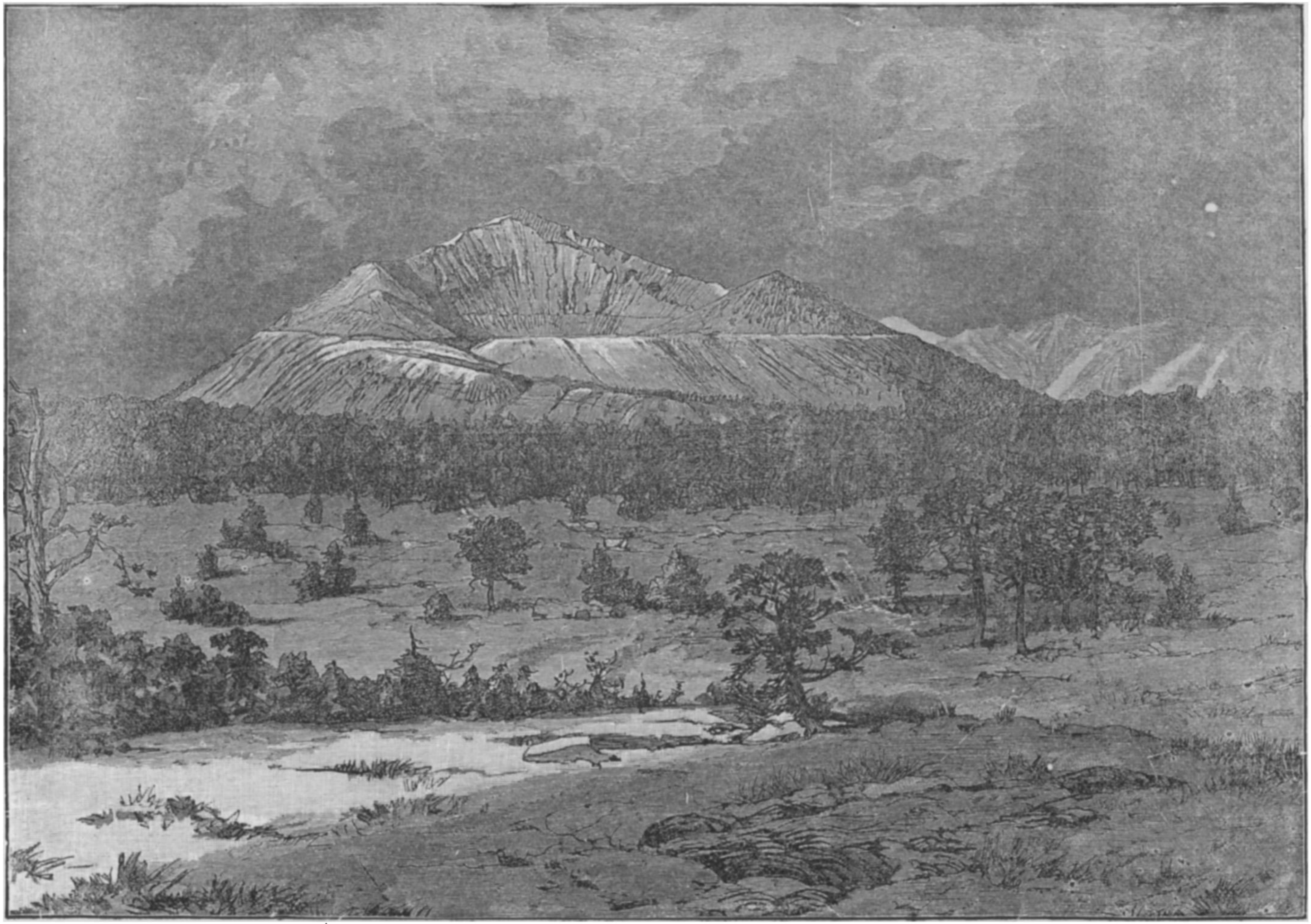
PLATE XIII.



View on Great Salt Lake Desert, showing mountains half buried by lake sediments.

PLATE XIV.



Pavant Butte, a sublacustrine volcano.

banks." Here again the inquiry arises, How could these tumultuous, " unimaginable floods " have poured southward " without cessation " if the ice-sheet was so thin and meager as Mr. Lesley imagines? The hyper-cataclysmal language here used for one series of phenomena, the result of a melting of an ice-sheet which was merely thick enough to "polish off" the topography of a continent, appears somewhat illogical and extreme. Should it not apply to the ice-mass as well? Farther on, to account for "vast heaps of rounded boulders" and other drift deposits on the tops of crests, ridges and hills at elevations of near 1000 feet in the counties above named, the director of the survey remarks: " It seems to me necessary to suppose some sort of submergence of the region beneath sea-level, or, what will amount to the same thing, a general rise of ocean-level to 800′ or 1000′, A. T. This would flood all Southeastern Pennsylvania to within a few hundred feet of the crests of its mountains, and account for most of the terrace deposits in this region."

While Northeastern New England has evidently been submerged some 500 feet, as marine fossils clearly indicate, are there any facts which show that this submergence extended much, if any, below New York city? We have supposed that south of this point the oscillation of the coast line was confined to but a few feet, as witnessed by the position near sea-level of the Quaternary beds of South Carolina.

The continued survey of the surface geology of a region like Pennsylvania, which lies both south and north of the great terminal moraine, will, in the end, aid much in solving such questions as have been brought up in the present able report.

SECOND REPORT OF THE U. S. GEOLOGICAL SURVEY.[1]—Though this report has been issued for some time it has not been noticed in this magazine. It is a bulky royal octavo volume, well printed on good paper, with excellent and abundant illustrations (sixty-one plates and thirty-two wood-cuts); the mechanical execution being much superior to the average Government report. The more notable contents are the reports on the physical geology of the Grand Cañon district by Capt. C. E. Dutton; Contributions to the history of Lake Bonneville, by G. K. Gilbert; abstract of a report on the geology and mining industry of Leadville, by S. F. Emmons; a summary of the geology of the Comstock lode and the Washoe district, by Geo. F. Becker; production of the precious metals in the United States, by Clarence King; a new method of measuring heights by means of the barometer, by G. K. Gilbert.

The splendid report of Captain Dutton on the Grand Cañon district having been published in full, we shall defer our notice of

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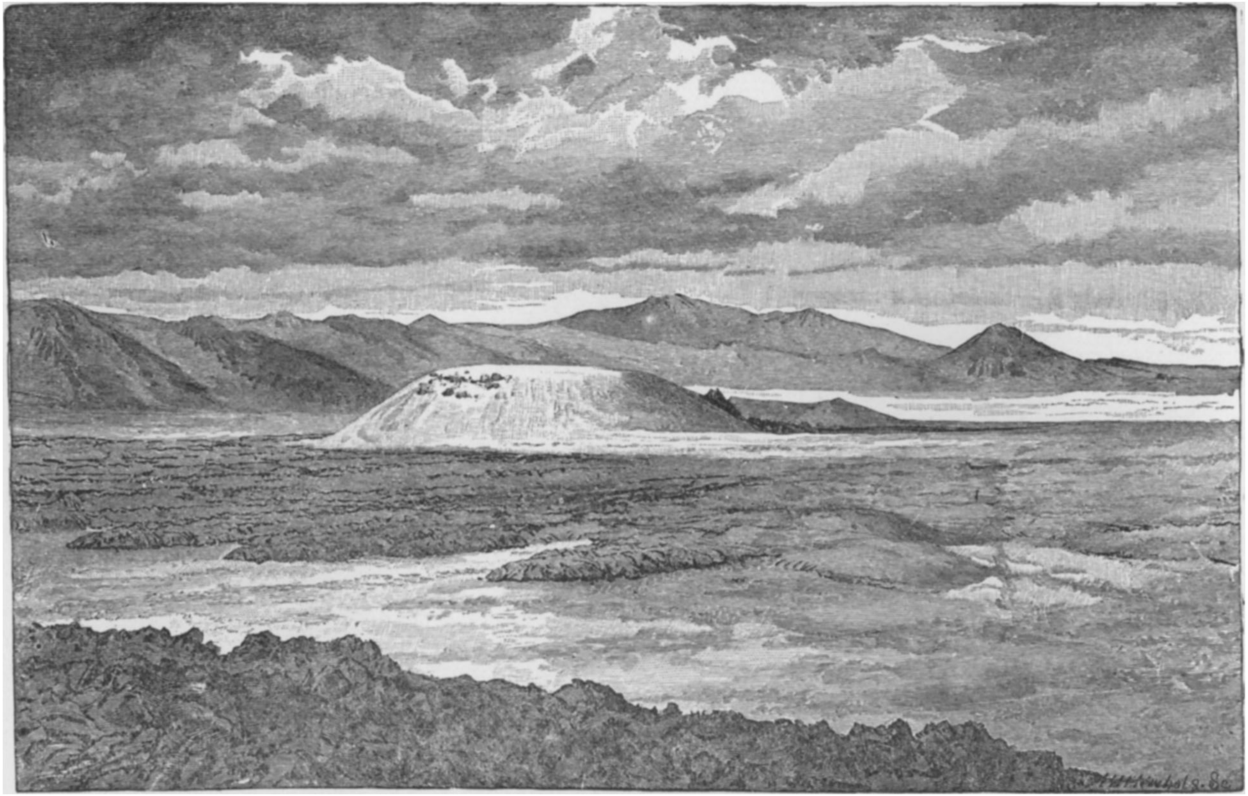
[1] *Second Annual Report of the United States Geological Survey to the Secretary of the Interior, 1880–'81.* By J. W. POWELL, director. Washington, 1882. Royal 8vo, pp. 588.

PLATE XV.



Tabernacle Crater and lava beds.

it to another occasion, and meanwhile draw attention to Mr. Gilbert's elaborate essay on Lake Bonneville, a subject which he has studied for a number of years past.

The sediments of this ancient Quaternary lake rest upon Pliocene rocks, which are hard enough to be used as building stone, and in many places have been upturned, faulted, while portions, separated from their continuations in the valley, have been carried high up on mountain flanks, where they have been eroded into typical mountain forms.

From his study of the lake sediments and ancient beaches, Mr. Gilbert suggests the following history of the lake:

1. A long period of dry climate and low water, during which the mountains of the desert were buried and the alluvial slopes of marginal mountains were formed (Pl. XIII).

2. A period of moist climate and high water, during which the yellow clay was deposited and the shore was carried within ninety feet of the summit of the lowest barriers of the basin.

3. A period of extreme dryness, during which the lake disappeared and its salt was buried.

4. A relatively short moist period, during which the white marl was thrown down, and within which the water overran the barrier, diminishing by erosion its height at the point of discharge.

5. The present period of relative dryness.

The volcanic rocks of the lake valley are basalts; of these Pavant Butte (Pl. XIV), situated between Fillmore and Deseret, is the most conspicuous. It is entirely composed of tuff. Midway between its base and its summit it is encircled by a terrace formed at the highest stage of the lake. The mountain was a sublacustrine volcano; its cone having been completed during the highest stage of the lake.

On the other hand another volcano, the Tabernacle (Pl. XV), has no "benches" or shore lines, and no lake beds resting upon it. The volcano began to be formed there during a high stage of the lake, and was continued or renewed after the water had fallen below the level of the vent; while facts show that the date of the last eruption from the vent was just before the final subsidence of the water. The period of volcanic activity has lasted, then, through the entire history of the lake, and perhaps the end has not yet been reached. "No one," says Mr. Gilbert, "who has seen the fresh, black, unworn surfaces of the most recent *coulees*, still absolutely barren of vegetation, could be affected by surprise if it should some day be announced that the now quiescent fires had again broken forth."

It appears that there is a difference in the height of the Bonneville and Provo shore lines, neither of the two shore lines being now horizontal or parallel; hence it is inferred that there have been orographic movements both during the existence of the last high stage of the water and since the final subsidence; and it seems that the region of the eastern margin of Lake Bonneville has recently fallen and is still subsiding. Mr. Gilbert has also found that a recent fault has taken place along the Wasatch range, not yet completed in the rear of Salt Lake city, and that the Wasatch range, the greatest mountain mass of Utah, has recently increased in height, and is supposed to be still growing.

The remains of Lake Bonneville is now but a great shallow brine pool, and resting on the surface of a broad plain. "Its mean depth is scarcely fifteen feet, and only a slight oscillatory movement of the plain would be necessary to decant its waters into another portion." It thus appears that the Mormons are exposed to the liability not only of losing their lake, but also their chief city!

HOPLEY'S SNAKES, CURIOSITIES AND WONDERS OF SERPENT LIFE.[1]—This pleasantly written book ought certainly to cure some of its many readers of their inherited hatred of snakes. The introduction brings out amusingly the confusion of names and natures which prevails among humanity, and the publisher's dread that he should lose subscribers if he put snakes in his magazine is but a mild manifestation of the ordinary horror of these creatures.

Thoroughly aware that the majority of even those people who have read of the peculiar structure of the skeleton, and especially of the jaws of a snake, do not realize the manner in which these peculiarities, correlated as they are with important departures from the ordinary reptilian type in the soft parts of the body, modify the habits and actions of snakes, Miss Hopley is careful to describe from the life how snakes feed; what the tongue is and is for; how snakes breathe and hiss; how they climb and constrict their prey; and how their teeth and fangs are constructed and arranged.

The author avers that a few years ago she knew nothing about snakes, and it is this fact, joined with sound judgment and correct observation, that has enabled her to write a book that speaks to those who do not know. When she discusses such questions as "Do snakes drink?" "Do they incubate their eggs?" and "Do they afford a refuge to their young?" she not only critically examines the opinions of others, but adds observations of her own that seem convincing. For example, the yellow Jamaica boa's method of imbibition, is thus described: "The snake kept its mouth just below the level of the water, and the only action or movement seen was at the back of the head, or on each side of the neck, like a pulsation, as the water passed down in short gulps. This is the 'suction' which writers describe, a drawing in of the liquid; but the lips do not take part in the act. When,

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[1] *Snakes, Curiosities and Wonders of Serpent Life.*—By Catherine C. Hopley. Griffith & Farran, St. Paul's Churchyard, London, and E. P. Dutton & Co., New York, 1882.